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(54) Title of the Invention: Usage frequency indicator card, and a method and apparatus for forming an indicator mark thereupon  
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(72) Inventor	Shuichi HASHIMOTO	Yasugi Seimitsu K.K. 114-1 Enoshima-cho, Yasugi-shi, Shimane-ken
(71) Applicant	Hitachi Metals, Ltd.	2-1-2 Marunouchi, Chiyoda-ku, Tokyo
(71) Applicant	Yasugi Seimitsu K.K.	114-1 Enoshima-cho, Yasugi-shi, Shimane-ken

## SPECIFICATION

### Title of the Invention

Usage frequency indicator card, and a method and apparatus for forming an indicator mark thereupon

### Claims

1. A usage frequency indicator card whereupon an embossment is formed in a flat plate format in a prescribed position to create a usage frequency indicator mark.
2. The usage frequency indicator card as defined in Claim 1, wherein the material used to form the embossment is a material that changes color.
3. A method for forming the indicator mark for the usage frequency indicator card, wherein the embossment is formed by sandwiching a card between a receiving die having a through-hole or indentation and a punch with a beveled or rounded edge that approaches and retracts in relation to the aforementioned hole or indentation.
4. An apparatus for forming the indicator mark for the usage frequency indicator card comprising a receiving die that has a through-hole or indentation formed inside of a plane, an opposing die having a through-hole that faces the aforementioned plane with only a small amount of space between itself and the plane and that lines up against the aforementioned through-hole or indentation, and a punch with a beveled or rounded edge that passes through the through-hole, wherein said punch is constructed so that it can approach or retract in relation to the aforementioned hole or indentation.

### Detailed Explanation of the Invention

(Industrial Field of Application)

The present invention relates to a usage frequency indicator card, such as a magnetic card, and a method and apparatus for forming its indicator mark.

(Prior Art)

In recent years, magnetic recording cards known as prepaid cards that are widely used for card-operated telephones have indicator marks that indicate the number of uses remaining depending upon the frequency of use. One commonly used method for forming this type of mark, as disclosed in Utility Model Application No. S61-12153, is to punch small holes on the surface of the magnetic card to indicate the number of remaining uses. A more detailed explanation of this type of conventional mechanism is provided according to the illustration shown in FIG. 2, which is comprised of drive source 11, punch 1, punch guide 8, dice 5, reset spring 7, and chute 6 for the hole-punch chads as well as hole-punch chad collector 9. In FIG. 2, a card (not shown in the drawing) is inserted into insertion slot 4 in the direction indicated by the arrow, is stopped at a prescribed position, punch 1 is driven by drive source 11 consisting of a magnetic solenoid and a hole is punched into the surface of the card. The chads that are generated from punching the holes pass through chute 6

and are transported to hole punch chad collector 9.

(Problems the Invention is to Solve)

For the conventional method, once the holes were punched into the card, a chute for collecting the hole-punch chads needed to be installed underneath the dice, which also required that a sensor be installed for detecting whether or not hole-punch chads had become clogged inside the chute as well as an opening in the chute for removing the clogged chads.

In addition, the hole-punch chads that collected in the hole-punch chad collector had to be disposed of on a regular basis.

The punch and the dice also needed to be maintained to ensure a sharp cutting blade, which required the use of high-grade materials and involved maintenance and inspection.

An object of the present invention is to provide a usage frequency indicator card and a method and apparatus for forming its indicator mark thereupon wherein hole-punch debris is not generated and the necessity of maintenance is eliminated.

(Means for Solving the Problems)

The main point of the present invention is to form an embossment, or in other words, a protrusion, on one side of a plate card without forming punched holes that generate hole-punch debris for the purpose of indicating the frequency of use of a magnetic card.

The present invention pertains to a usage frequency indicator card in which an embossment is formed in a flat plate format in a prescribed position to create a usage frequency indicator mark.

The present invention also pertains to a method for forming the indicator mark for a usage frequency indicator card, wherein the embossment is formed by sandwiching a card between a receiving die having a through-hole or an indentation and a punch with a beveled or rounded edge that approaches and retracts in relation to the aforementioned hole or indentation, and an apparatus for forming the indicator mark for a usage frequency indicator card comprised of a receiving die that has a through-hole or indentation formed inside of a plane, an opposing die having a through-hole that faces the aforementioned plane with only a small amount of space between itself and the plane and that lines up against the aforementioned through-hole or indentation, and a punch with a beveled or rounded edge that passes through the through-hole, wherein said punch is constructed so that it can approach or retract in relation to the aforementioned hole or indentation.

(Operation of the Invention)

According to the present invention, embossments or raised protrusions are formed instead of punching holes, thereby eliminating hole-punch debris and in turn eliminating the necessity for a chute and a housing unit for the hole-punch debris, a sensor or an opening as well as the necessity to provide maintenance for these items.

Embossments are more tactile than punched holes and are therefore more advantageous for the blind. In addition, embossments are more readily detected by machines or electronic devices and are therefore easier to double-check against the magnetic recording.

The easiest and most secure method for forming embossments is to sandwich a card between a receiving die having a through-hole or an indentation and a punch with a beveled or rounded edge. In addition, a receiving die and a punch used for embossing do not need to have a sharp cutting edge and do not need to adhere to other rigorous standards pertaining to relative position, such as clearance, thus allowing for a more simple apparatus that is easier to maintain.

The embossments formed using these types of tools are formed by applying localized pressure or by means of plastic deformation. So, for example, fraudulent use, such as when the embossed portion is flattened by irreversibly changing the color of the localized portion using a tape writer or pressure-sensitive paper, can be detected by a visual inspection and can therefore be easily prevented.

For the apparatus pertaining to the present invention, an opposing die is necessary to securely hold the card between itself and the receiving die, and although the embossing can also be done with a cylindrical-shaped punch that does not have rounded edges, it is preferable to plane or round the edges of the punch before using it to prevent damage to the cards and reduce discrepancies in the embossment shapes when installing a new punch for continued use of the same apparatus.

(Embodiments)

We will next provide an explanation of an embodiment of the apparatus for forming the indicator marks that pertains to the present invention, with reference to the drawings.

FIG. 1 is a cross sectional view of the apparatus pertaining to the present invention. In this drawing, punch 1 shaped with a semispherical tip is pushed into a small hole provided at the end of a punch holder that is pushed in at its rear end by plunger 2. Die 5, which is the receiving die that is concentric with punch 1 and the through-hole, and card guide 3, which

is the opposing die, are attached to 12, which functions as both the yoke and the frame.

A magnetic card (not shown in the drawing) is inserted into card insertion slot 4 in the direction indicated by the arrow and stops at a prescribed position. At this point, power is supplied to magnetic solenoid 10, which is used for driving the apparatus, plunger 2 is suctioned downward to lower it, the card is then sandwiched between punch 1, which is secured by plunger 2, and die 5, which is located underneath the punch and has a through-hole processed with a rounded edge, and an indentation is formed on the top surface of the card while a protrusion, or embossment, is formed on the bottom surface of the card. When the power supply to magnetic solenoid 10 is cut off, plunger 2 and punch 1 are retracted and reset to the upper position by reset spring 7. Sufficient space is allowed between card guide 3 and die 4 [sic] to accommodate the thickness of the card and the height of the embossment, so that the embossed card can be removed once the embossment is completed.

The diameter of punch 1 is 1.2 mm, the hole in die 5 can be unprocessed or processed with a chamfered edge of 0.1 to 0.5 mm or a rounded edge, and the clearance between punch 1 and the through-hole in die 5 can be shaped nicely in the form of an indentation that is within a range of 0.05 to 0.50 mm.

In addition, after repetitive operation of 100 uses, the apparatus was able to continue performing stable embossing. For the present embodiment, card guide 3 and die 5 were constructed using thin plates in order to ensure a smooth finish on the surface of the card and to prevent glossy photo cards from getting scratched, and due to the use of tempered stainless steel strips, the apparatus can be inexpensively manufactured.

(Effects of the Invention)

The present invention provides an apparatus for forming indicator marks that is easier and less expensive to maintain compared to the conventional machines that required a chute to dispose of hole punch chads, a sensor for detecting when the hole punch chads had become clogged and other related apparatus that were used to punch holes and form usage frequency indicator marks, and since the present invention eliminates the need for such components, not only is it advantageous in terms of the ability to configure the entire apparatus more compactly, but it also has the overall benefit of being able to double check embossments and more easily prevent fraudulent use of cards.

Furthermore, for the conventional hole punch machines, the position of the punch and the dice (concentricity) needed to be set with a high degree of precision when assembling the machine and care needed to be taken to avoid damaging the end of the punch and the edges of the dice. However, the mechanism for the embossing apparatus that pertains to the present invention operates to automatically align the axial center of the punch and the dice holes, so there is no possibility of damaging the punch or dice holes even if they become slightly misaligned, thereby allowing for easier assembly of the apparatus.

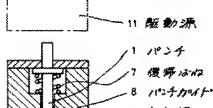
In addition, the tip of the punch and the dice holes in the mechanism that pertain to the present invention do not have any sharp edges, which is very advantageous in terms of durability, and the present invention can achieve a product life that is several times that of the conventional hole punch unit.

#### **Brief Description of the Drawings**

FIG. 1 is a cross-sectional view of an embodiment of a hole punch unit for forming embossments that pertains to the present invention. FIG. 2 is a cross-sectional view of a conventional hole punch unit.

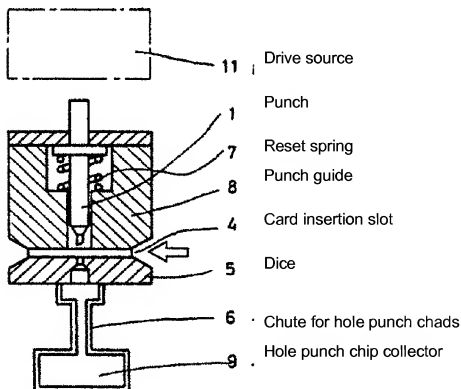
1: punch; 2: plunger; 3: card guide; 4: card insertion slot; 5: dice; 6: chute for hole punch chads; 7: reset spring; 8: punch guide; 9: hole punch chad collector; 10: magnetic solenoid; 11: drive source; 12: yoke/frame

Patent Applicants: Hitachi Metals Co., Ltd. [Seal]  
Yasugi Seimitsu Co., Ltd. [Seal]



- 2 Plunger
- 7 Reset spring
- 1 Punch
- 10 Magnetic solenoid
- 12 Yoke/frame
- 3 Card guide
- 4 Card insertion slot
- 5 Dice

FIG. 2



- 11 Drive source
- 1 Punch
- 7 Reset spring
- 8 Punch guide
- 4 Card insertion slot
- 5 Dice
- 6 Chute for hole punch chads
- 9 Hole punch chip collector